PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-076434

(43)Date of publication of application : 15.03.2002

(51)Int.Cl. H01L 33/00
C09K 11/08
C09K 11/64

(21)Application number : 2000-258090

(22)Date of filing : 28.08.2000

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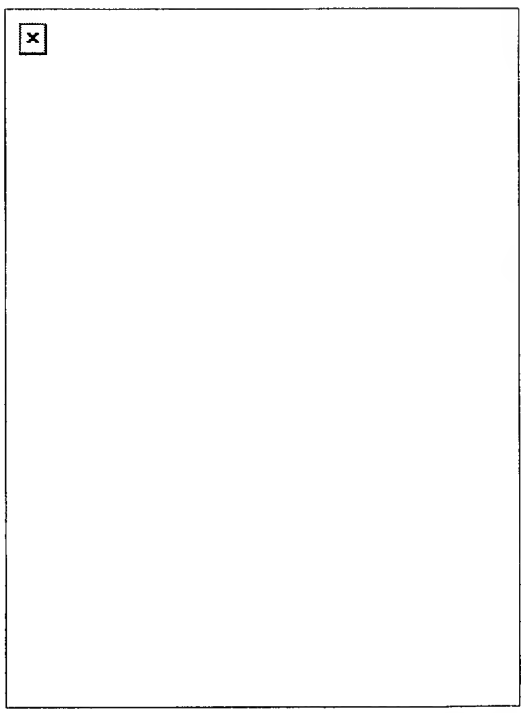
(54) LIGHT EMITTING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a light emitting device of a novel constitution of combination of a light emitting element and a fluorescer.

SOLUTION: The light emitting device comprises a light emitting element having an emitting light wavelength of a range of 360 to 550 nm, and a fluorescer made of a Ca-Al-Si-O-N oxynitride for activating Eu2+. Thus, a part of the light from the emitting element is wavelength converted by the fluorescer, and emitted.



LEGAL STATUS

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TECHNICAL FIELD

[Industrial Application] This invention relates to luminescence equipment. In detail, it is related with the luminescence equipment which combined the light emitting device and the fluorescent substance.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] The luminescence equipment which emits light in the different luminescent color from the light of a light emitting device is developed from mixing and emitting the light of the light emitting device by which carries out wavelength conversion of a part of light of a light emitting device with a fluorescent substance, and wavelength conversion is not carried out with the light concerned by which wavelength conversion was carried out. For example, the luminescence equipment using the yttrium aluminum garnet system fluorescent substance (YAG) which carried out activation of the cerium (Ce) as a fluorescent substance is marketed using the III group nitride system compound semiconductor light emitting device which emits light in the light of a blue system as a light emitting device. A fluorescent substance layer is formed in the direction of light emission of a light emitting device by laying a light emitting device in the cup section of a leadframe, and filling up with this luminescence equipment the light transmission nature ingredient which made the cup section concerned distribute a fluorescent substance (YAG), for example. With this configuration, in case a part of light of a light emitting device passes a fluorescent substance layer, absorption and after wavelength conversion is carried out, it is emitted to a fluorescent substance (YAG), without being absorbed by the fluorescent substance, a fluorescent substance layer is penetrated and other light is emitted. And luminescence of a white system is obtained by mixing these two kinds of light.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] One of the objects of this invention is offering the luminescence equipment of a new configuration of having combined the light emitting device and the fluorescent substance. Moreover, other objects of this invention are offering the high luminescence equipment of luminous efficiency. Furthermore, this invention aims at solving the technical problem of the following in the luminescence equipment of the above-mentioned conventional example. First, according to examination of this invention persons, the luminescent color obtained with above luminescence equipment is that blue development of the luminescence equipment with which it is white with equipment and the white light of high quality is acquired more which it was, and was carried out and green cut is desired. That is, it is that development of the luminescence equipment which emits light in the white light which contains a red component, a green component, and a blue component with sufficient balance is desired. Moreover, it is comparatively expensive from containing a metal with the rare fluorescent substance (YAG) used with above luminescence equipment, consequently is that the manufacturing cost of luminescence equipment increases. Furthermore, adjustment of the color mixture of the light of a light emitting device and the light of a fluorescent substance is difficult, and hard to manufacture the luminescence equipment of the fixed luminescent color. [are stabilized and] That is, it is necessary to make regularity thickness of the fluorescent substance layer which needs to carry out wavelength conversion of a fixed quantity of the light with a fluorescent substance in order to obtain the fixed luminescent color, therefore is prepared in the direction of light emission of a light emitting device in the configuration of the above-mentioned conventional example. However, since formation of a fluorescent substance layer is performed by dropping the light transmission nature ingredient of fluorescent substance content at the cup section etc. after it lays a light emitting device in a leadframe, it is difficult to control the thickness with a sufficient precision.

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MEANS

[Means for Solving the Problem] this invention persons hit on an idea in the following configurations, as a result of inquiring wholeheartedly that at least one of the above objects should be attained. that is, it is characterized by what this invention is equipped with the light emitting device in the range whose luminescence wavelength is 360nm - 550nm, and the fluorescent substance which consists of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+, and wavelength conversion of a part of light of said light emitting device is carried out with said fluorescent substance, and is emitted -- and it comes out. [luminescence]
[0005] According to the above-mentioned configuration, the luminescence equipment by new combination of using the light emitting device which has a specific emission peak wavelength, and the fluorescent substance which consists of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+ is offered. Moreover, the fluorescent substance of the above-mentioned configuration is excited by light with a wavelength of 360nm - 550nm, and emits light at high effectiveness in the light of long wavelength from excitation light. Therefore, the luminescence equipment of the above-mentioned configuration has high luminous efficiency. Furthermore, the presentation of the parent consists of calcium, aluminum, Si, O, and N, and the fluorescent substance of the above-mentioned configuration can be said to be able to manufacture with a general and cheap ingredient as compared with the fluorescent substance (YAG) used in the conventional example. Therefore, the low luminescence equipment of a manufacturing cost is offered.

[0006]
[Embodiment of the Invention] What a light emitting device has in the range the luminescence wavelength of whose is 360nm - 550nm is used. As for the light of this wavelength range, it is possible to excite the below-mentioned fluorescent substance and to make it emit light with a well head. In selection of a light emitting device, the excitation peak of the below-mentioned fluorescent substance and the luminescent color, and the color of the light which emits light from the whole luminescence equipment in a list are taken into consideration. If it is going to obtain luminescence of a white system, the light emitting device which has used the light emitting device in the range whose luminescence wavelength is 450nm - 550nm in the range whose luminescence wavelength is 450nm - 500nm desirable still more preferably will be used. If the light emitting device from which luminescence wavelength (luminescent color) differs is used, the color of the light emitted from luminescence equipment can be changed.
[0007] Especially the formation ingredient of a light emitting device is not limited. A light emitting device equipped with an III group nitride system compound semiconductor layer, i.e., an III group nitride system compound semiconductor light emitting device, can be used suitably. An III group nitride system compound semiconductor is expressed with AlXGaYIn1-X-YN (0<=X<=1, 0<=Y<=1, 0 <=X+Y<=1) as a general formula, and includes the so-called 3 yuan system of the so-called 2 yuan system of AlN, GaN, and InN, AlxGa1-xN, AlxIn1-xN, and GaxIn1-xN (it sets above and is 0< x<1). Boron (B), a thallium (Tl), etc. may permute some III group elements, and Lynn (P), an arsenic (As), antimony (Sb), a bismuth (Bi), etc. can permute some nitrogen (N). As for the component functional division of a light emitting device, it is desirable to constitute from an above-mentioned 2 yuan system or an III group nitride system compound semiconductor of a 3 yuan system.
[0008] An III group nitride system compound semiconductor may contain the dopant of arbitration. Si, germanium, Se, Te, C, etc. can be used as an n mold impurity. As a p mold impurity, Mg, Zn, Be, calcium, Sr, Ba, etc. can be used. In addition, after doping p mold impurity, an III group nitride system compound semiconductor is exposable to electron beam irradiation, a plasma exposure, or heating at a furnace. An III group nitride system compound semiconductor can be formed by the molecular-beam crystal growth method (MBE law) of common knowledge besides metal-organic chemical vapor deposition (MOCVD law), halide system vapor growth (HVPE law), the spatter, the ion plating method, a cascade shower method, etc.

[0009] Although the construction material of the substrate into which an III group nitride system compound semiconductor layer is grown up will not be limited especially if an III group nitride system compound semiconductor layer is grown up, sapphire, a spinel, silicon, carbonization silicon, a zinc oxide, gallium phosphide, gallium arsenide, a magnesium oxide, manganese oxide, an III group nitride system compound semiconductor single crystal, etc. can be mentioned as an ingredient of a substrate, for example. Especially it is desirable to use silicon on sapphire, and it is still more desirable to use the a-th page of silicon on sapphire. In addition, in addition to the above-mentioned light emitting device, the light emitting device which does not excite the below-mentioned fluorescent substance can also be used, and, thereby, the luminescent color of luminescence equipment can be changed or adjusted.

[0010] As a fluorescent substance, calcium-aluminum-Si-O-N system oxy-night RAIDO (calcium-aluminum-Si-O-N:Eu2+) which carried out activation of Eu2+ is used. This fluorescent substance has an excitation peak in about 300nm and about 490nm, and has a luminescence peak in the range of about 580nm - about 700nm. Therefore, it excites by the light (a luminescence peak is in the range of 360nm - 550nm) of the above-mentioned light emitting device, and light is emitted in the light of long wavelength from excitation light. Since especially about 490nm excitation peak is well in agreement with the wavelength of the light of a blue system, it can change the light from the light emitting device concerned efficiently by combining with the III group nitride system compound semiconductor light emitting device which carries out luminescence of a blue system. On the other hand, the emission spectrum of this application fluorescent substance has a luminescence peak in about 580nm - about 700nm as mentioned above, and the light emitted from a fluorescent substance has the color of an orange system - red system. Therefore, luminescence of a white system with very high color rendering properties with a rich red component is obtained by combining the light emitting device and the fluorescent substance concerned of a blue system, and mixing the light from both. A luminescence peak shifts this application fluorescent substance to a long wavelength side continuously by making the content nitrogen volume increase. Therefore, it is possible by adjusting content nitrogen volume suitably to change the luminescence wavelength (luminescent color) of a fluorescent substance.

[0011] this application fluorescent substance can be prepared as a vitreous humour or a crystalline, and anything of description can use it. The fluorescent substance of a vitreous humour or a crystalline can be processed and used for fine particles, grain, or a board. That is, various configurations can be processed, it can use for them and the degree of freedom of a configuration is high. Here, that by which irregularity and/or a curved surface are formed in the thing, the whole surface, or two or more fields a plate-like thing, the thing of the configuration which combined two or more plates, the whole surface, or two or more fields of whose are curved surfaces, a cap-like thing, a box-like thing, etc. are contained in a board. When processing and using for fine particles or grain, it is desirable to set the mean particle diameter to 20 micrometers or less. The mean particle diameter is set to 10 micrometers or less still more preferably. It considers as the mean particle diameter of 5 micrometers or less most preferably. By making the particle diameter of a fluorescent substance small, efficiently, it can absorb and wavelength conversion of the light from a light emitting device can be carried out.

[0012] As for the fluorescent substance processed into fine particles or grain, it is desirable to distribute a light transmission nature ingredient and to use. That is, being used as a fluorescent substance layer is desirable. As an ingredient of light transmission nature, an epoxy resin, silicon resin, a urea-resin, or glass is used. Two or more sorts of ingredients chosen as arbitration from these can also be used for these ingredients not to mention being used independently. The purpose of use, a service condition, etc. can be accepted and concentration distribution of the fluorescent substance in the ingredient of light transmission nature can be changed. That is, the amount of a fluorescent substance is changed continuously or gradually as a light emitting device is approached. For example, concentration of a fluorescent substance is enlarged in the part near a light emitting device. Thereby, the light from a light emitting device can be irradiated efficiently at a fluorescent substance. On the other hand, it is easy to be influenced of the heat generated in a light emitting device, and degradation of a fluorescent substance poses a problem. On the other hand, degradation of the fluorescent substance resulting from generation of heat of a light emitting device is controlled by making concentration of a fluorescent substance small as a light emitting device is approached. The layer which consists of an ingredient of the light transmission nature containing a fluorescent substance is prepared in the luminescence direction of a light emitting device. Although it is preferably formed so that the luminescence direction side of a light emitting device may be covered, the layer thru/or space which consists of another light transmission nature ingredient can also be prepared between layers and light emitting devices concerned.

[0013] By processing a desired configuration, the fluorescent substance of a vitreous humour can constitute a fluorescent substance layer from itself. Therefore, if the fluorescent substance of a vitreous humour is cast to a board, the amount of the light of the light emitting device in which wavelength conversion is carried out by the thickness of a board with a fluorescent substance can be adjusted. Thus, color mixture of the light of a fluorescent substance and the light of a light

emitting device can be adjusted in an easy and high precision by using the fluorescent substance of a vitreous humour.
[0014] Since this application fluorescent substance has afterglow nature, it can also make luminescence equipment emit light using this property. That is, time sharing of the light of a light emitting device and the light of a fluorescent substance can be carried out, and they can be made to emit by turning on a light emitting device intermittently. Thereby, the luminescent color of the luminescence equipment obtained by mixing with the light of a light emitting device and the light of a fluorescent substance can be adjusted. Delicate adjustment of the color tone of the light of the white system which emits light from luminescence equipment is attained by adjusting the luminescence time amount especially using the light emitting device of a blue system. What is necessary is just to drive a light emitting device according to pulse current, in order to make a light emitting device turn on intermittently. For example, if a full wave rectifier circuit or a half wave rectifier circuit is used, a light emitting device can be driven, using alternating current directly.
[0015] The location where the light of a light emitting device is irradiated is equipped with this application fluorescent substance, and it emits light by the light of a light emitting device. That is, wavelength conversion of a part of light of a light emitting device is carried out with a fluorescent substance. Thereby, the light of different wavelength (luminescent color) from the light of a light emitting device arises. And it will be mixed with the light by which wavelength conversion is not carried out with a fluorescent substance, and this light by which wavelength conversion was carried out will be emitted. Therefore, as the whole luminescence equipment, luminescence of a different color from the light of a light emitting device is obtained. In addition, the luminescent color can be changed by changing the presentation of a fluorescent substance. It can have and the luminescent color of the whole luminescence equipment can be adjusted.
[0016] As mentioned above, a fluorescent substance is distributed in the layer which consists of a light transmission nature ingredient, and, in a configuration of that the light from a light emitting device passes the layer concerned, the light of a light emitting device and the light of a fluorescent substance are automatically mixed in the layer concerned. However, the mode which mixes the light of a light emitting device and the light of a fluorescent substance is not limited above. For example, a fluorescent substance is arranged to island shape around a light emitting device. A part of light of a light emitting device can pass through between the islands of a fluorescent substance, and it can mix this light and light from a fluorescent substance for example, in a closure member. Moreover, a fluorescent substance is arranged in the location from which it separated from the optical axis of a light emitting device in luminescence equipment, it condenses and has the light from a fluorescent substance in it in the direction of an optical axis using a reflecting plate etc., and you may make it mix the light from a light emitting device, and the light from a fluorescent substance.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the shell mold LED 1 of the example of 1 of this invention.
[Drawing 2] It is the outline sectional view of the light emitting device 10 similarly used for LED1.
[Drawing 3] It is the outline sectional view of the light emitting device 100 of a configuration of having a reflecting layer directly under a luminous layer similarly.
[Drawing 4] It is the outline sectional view of the light emitting device 101 which similarly equips with a reflecting layer the field in which the semi-conductor layer of a substrate is not formed.
[Drawing 5] It is drawing showing the rectifier circuit used in an example 1.
[Drawing 6] It is drawing showing the light emitting device 10 in which the wrap fluorescent substance layer 37 was formed in the substrate side side.
[Drawing 7] It is the elements on larger scale showing the example which used the planar type Zener light emitting device 60 in LED1 of an example 1.
[Drawing 8] It is drawing showing the example which similarly formed the wrap fluorescent substance layer 80 for the substrate side in the planar type Zener light emitting device 60.
[Drawing 9] It is drawing showing the chip mold LED 2 which are other examples of this invention.
[Drawing 10] It is drawing showing the chip mold LED 3 similarly.
[Drawing 11] It is drawing showing the chip mold LED 4 similarly.
[Drawing 12] It is drawing showing the chip mold LED 5 similarly.
[Drawing 13] It is drawing showing the reflective mold LED 6 which are other examples of this invention.
[Drawing 14] It is drawing showing the source 7 of sheet-like light which are other examples of this invention.
[Drawing 15] It is the outline block diagram of LED115 used for the source 7 of sheet-like light.
[Drawing 16] It is drawing showing the source 8 of sheet-like light of other modes.
[Drawing 17] It is drawing showing the source 9 of sheet-like light using the color conversion filter 130 which are other examples of this invention.
[Drawing 18] It is drawing showing the cap mold LED 140 which are other examples of this invention.
[Drawing 19] It is drawing showing the luminescence equipment 150 of the electric bulb type which are other examples of this invention.
[Drawing 20] It is drawing showing the luminescence equipment 160 of the fluorescent lamp type which are other examples of this invention.
[Drawing 21] It is drawing showing the luminescence equipment 170 of the Braun-tube type which are other examples of this invention.
[Drawing 22] It is drawing showing the luminescence equipment 180 of the projector type which are other examples of this invention.
[Drawing 23] It is drawing showing luminescence LGT 190 which are other examples of this invention.
[Drawing 24] It is drawing showing the display 200 which are other examples of this invention.
[Drawing 25] In a display 200, it is drawing showing the example from which the formation mode of the fluorescent substance layer 215 differs.
[Drawing 26] It is drawing showing the display 210 using LED1 which is the example of this invention.
[Drawing 27] It is drawing showing the circuitry used for a display 210.
[Drawing 28] It is drawing showing the signal 300 for cars using LED2 which is the example of this invention.
[Description of Notations]
1 115 Shell Mold LED, 2 3 4 5 Chip Mold LED 6 The reflective mold LED, 7 8 9 The source of sheet-like light, 10 60

Light emitting device, 35 37 38 39 fluorescent-substance resin, 36 A fluorescent substance, 50 Closure resin, 110 A reflecting mirror, 215 A fluorescent substance layer, 140 Cap mold LED 150 160 170 180 Luminescence equipment, 151 163 Fluorescent glass, 171 A fluorescent screen, 181 A reflecting plate, 190 A luminescence LGT, 200 A display, 210 A display, 300 Signal for cars

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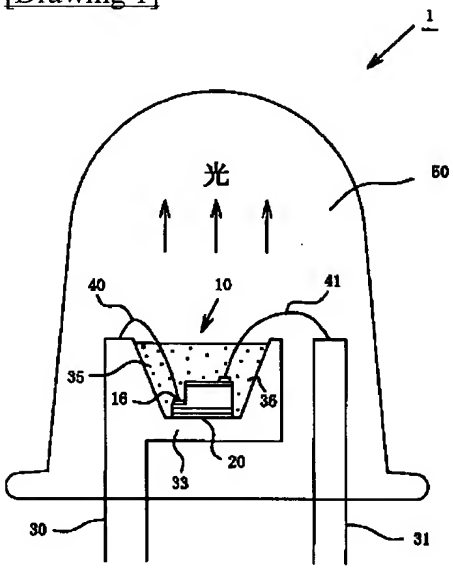
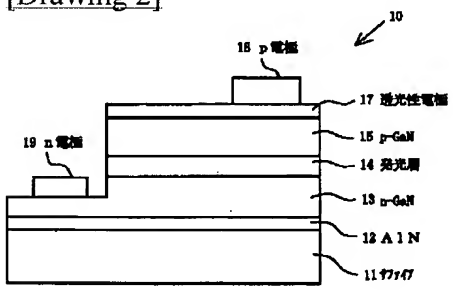
DRAWINGS

[Drawing 1]



[Drawing 2]



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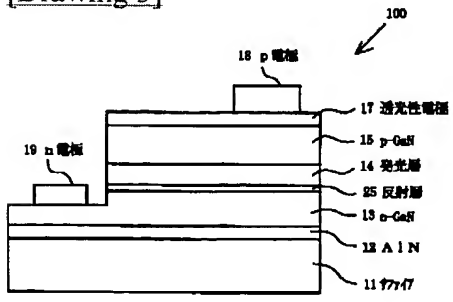

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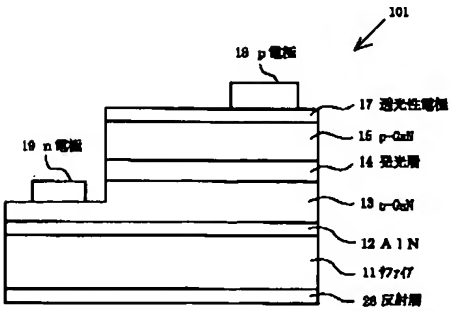

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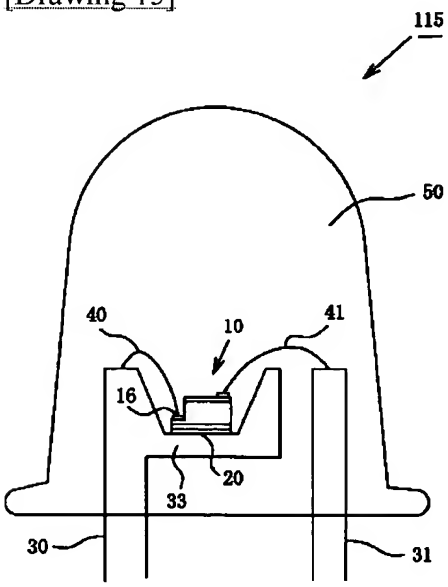

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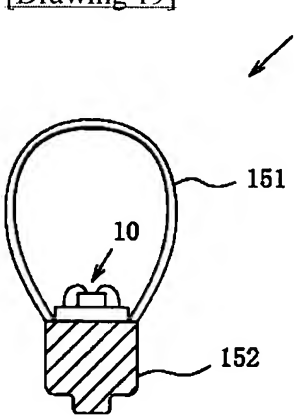

[Drawing 5]

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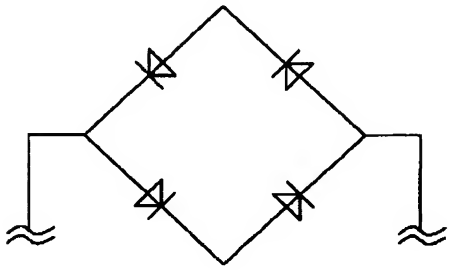

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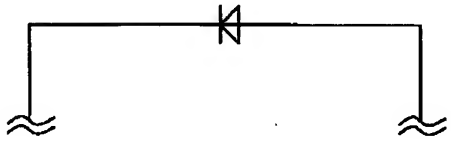

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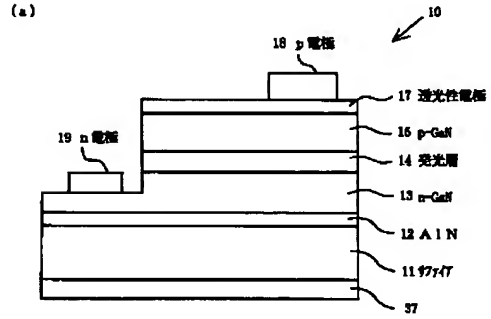

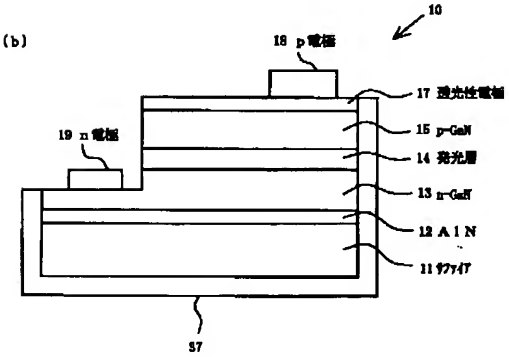

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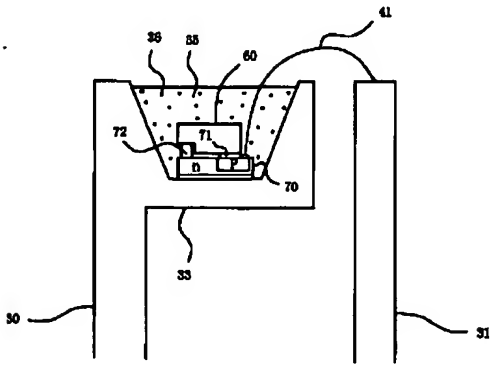

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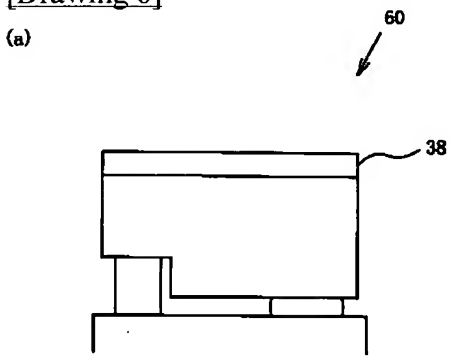

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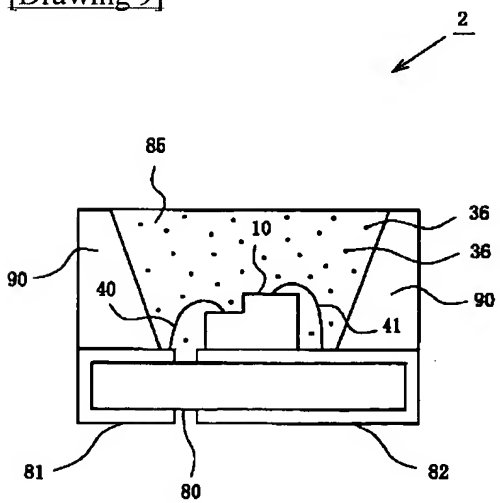

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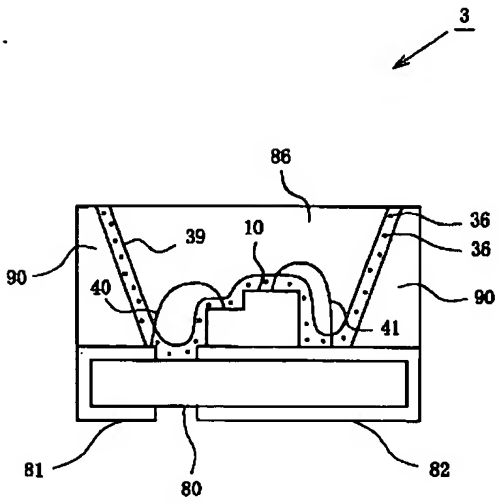

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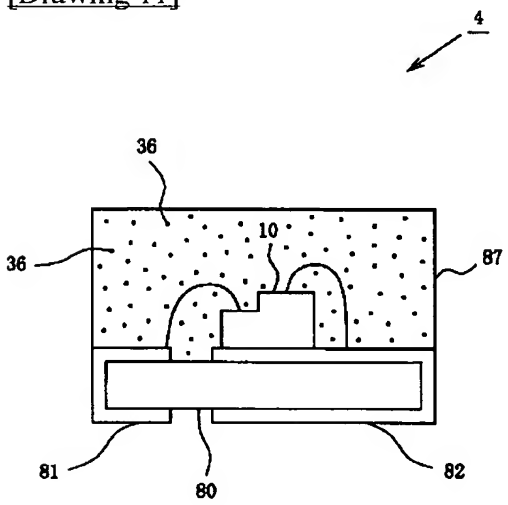

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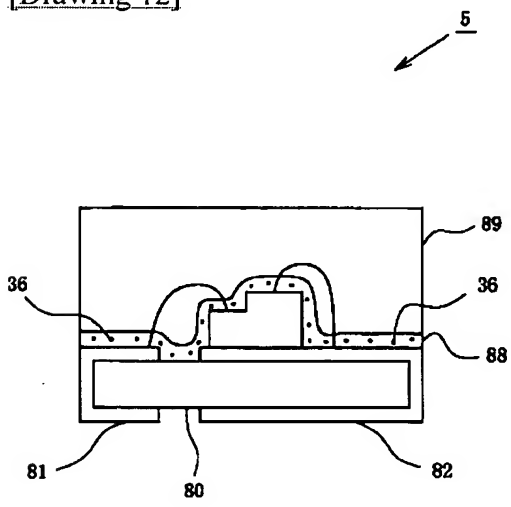

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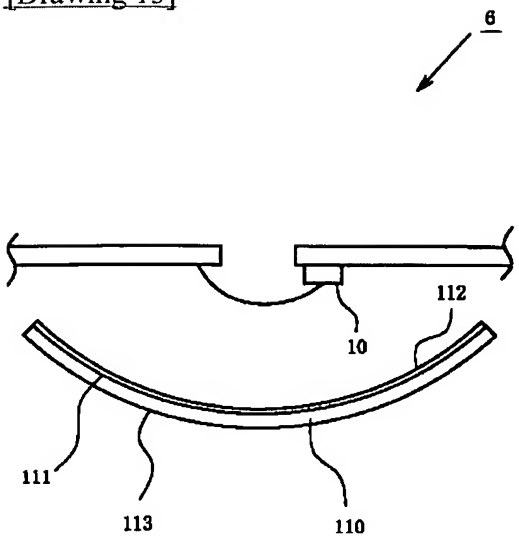
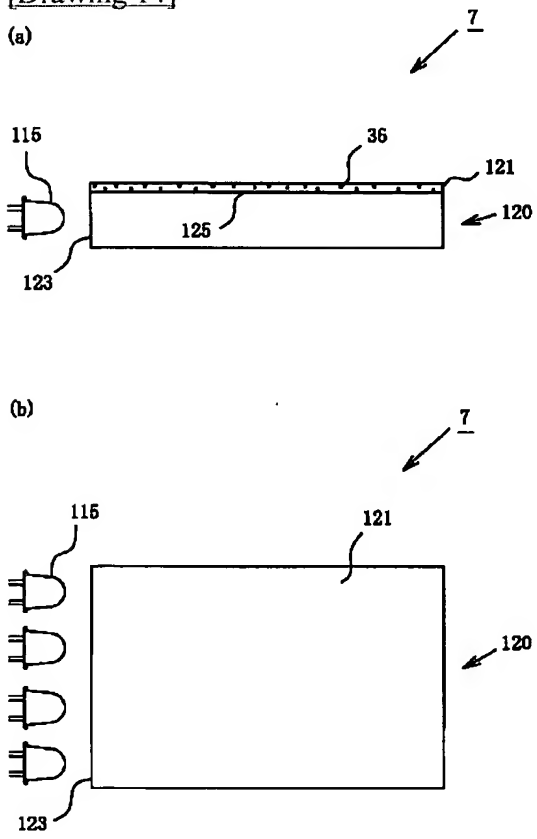
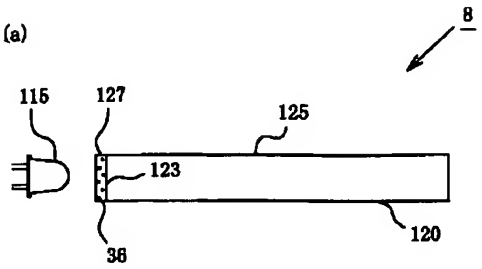


[Drawing 14]



[Drawing 16]

(a)



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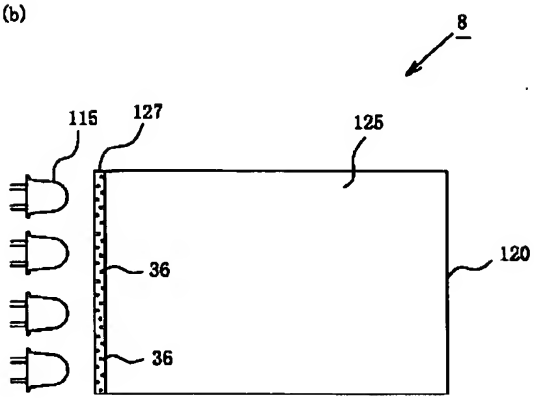
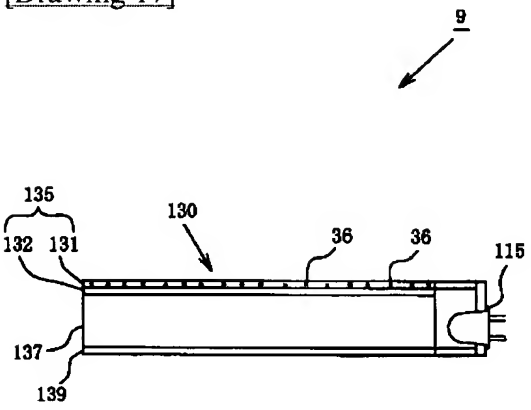
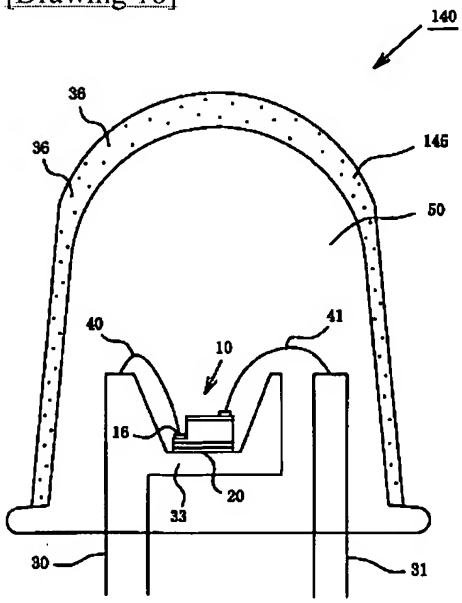


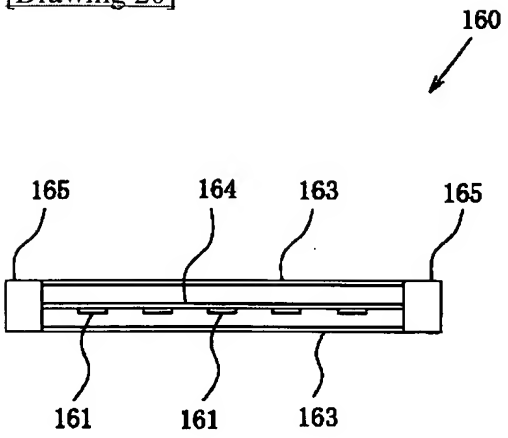
[Drawing 17]



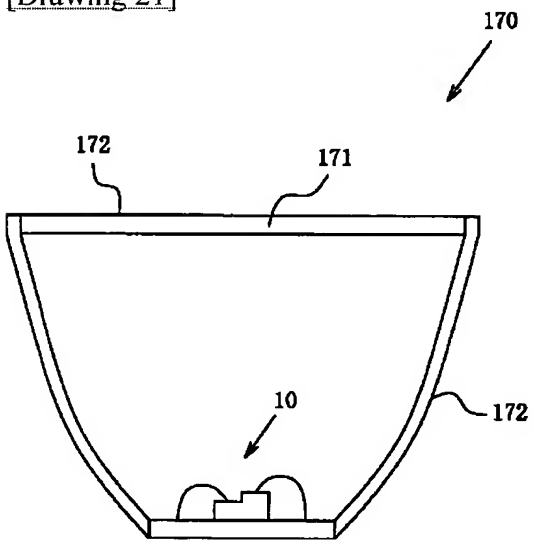
[Drawing 18]



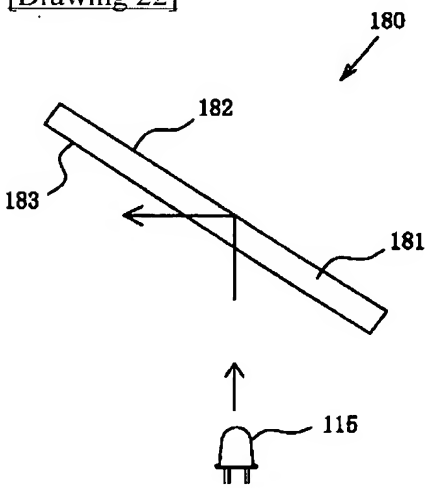
[Drawing 20]



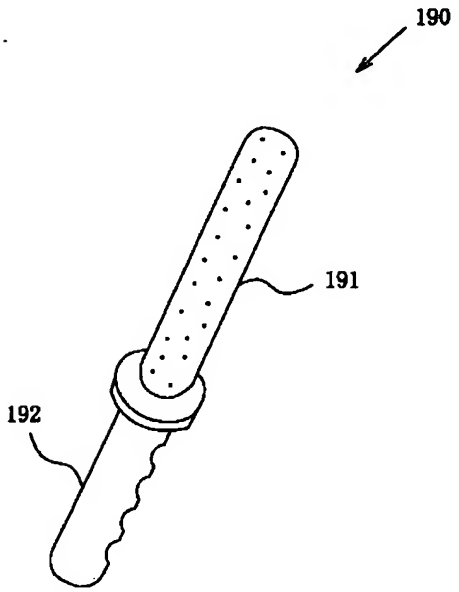
[Drawing 21]



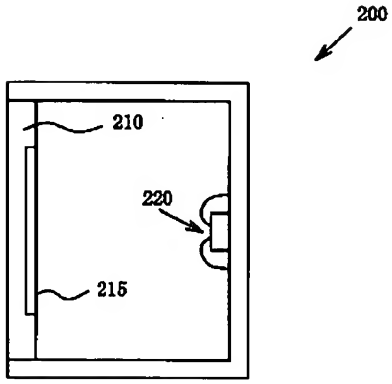
[Drawing 22]



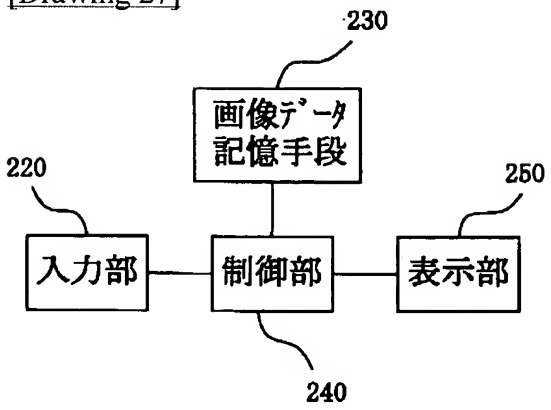
[Drawing 23]



[Drawing 25]

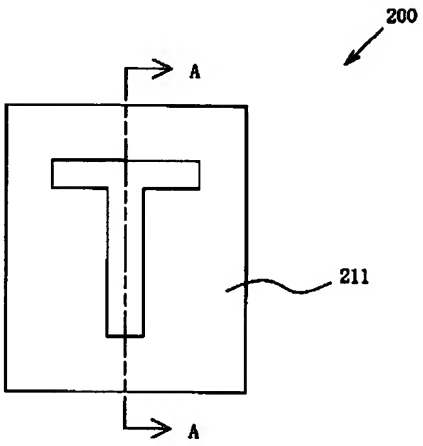


[Drawing 27]

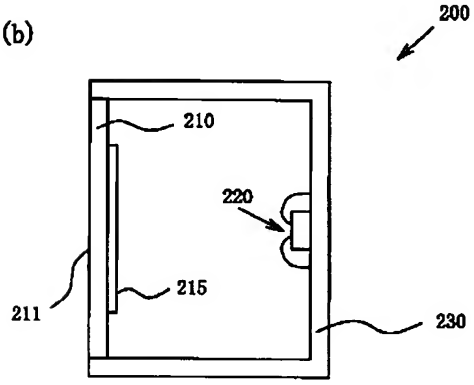


[Drawing 24]

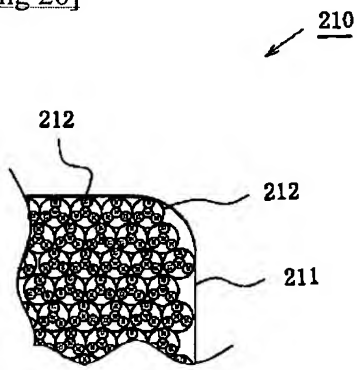
(a)



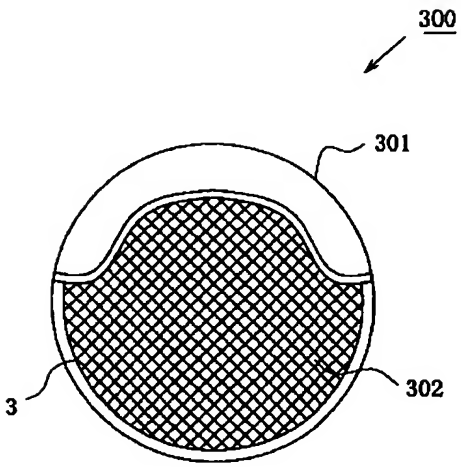
(b)



[Drawing 26]



[Drawing 28]



[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to luminescence equipment. In detail, it is related with the luminescence equipment which combined the light emitting device and the fluorescent substance.
[0002]
[Description of the Prior Art] The luminescence equipment which emits light in the different luminescent color from the light of a light emitting device is developed from mixing and emitting the light of the light emitting device by which carries out wavelength conversion of a part of light of a light emitting device with a fluorescent substance, and wavelength conversion is not carried out with the light concerned by which wavelength conversion was carried out. For example, the luminescence equipment using the yttrium aluminum garnet system fluorescent substance (YAG) which carried out activation of the cerium (Ce) as a fluorescent substance is marketed using the III group nitride system compound semiconductor light emitting device which emits light in the light of a blue system as a light emitting device. A fluorescent substance layer is formed in the direction of light emission of a light emitting device by laying a light emitting device in the cup section of a leadframe, and filling up with this luminescence equipment the light transmission nature ingredient which made the cup section concerned distribute a fluorescent substance (YAG), for example. With this configuration, in case a part of light of a light emitting device passes a fluorescent substance layer, absorption and after wavelength conversion is carried out, it is emitted to a fluorescent substance (YAG), without being absorbed by the fluorescent substance, a fluorescent substance layer is penetrated and other light is emitted. And luminescence of a white system is obtained by mixing these two kinds of light.
[0003]
[Problem(s) to be Solved by the Invention] One of the objects of this invention is offering the luminescence equipment of a new configuration of having combined the light emitting device and the fluorescent substance. Moreover, other objects of this invention are offering the high luminescence equipment of luminous efficiency. Furthermore, this invention aims at solving the technical problem of the following in the luminescence equipment of the above-mentioned conventional example. First, according to examination of this invention persons, the luminescent color obtained with above luminescence equipment is that blue development of the luminescence equipment with which it is white with equipment and the white light of high quality is acquired more which it was, and was carried out and green cut is desired. That is, it is that development of the luminescence equipment which emits light in the white light which contains a red component, a green component, and a blue component with sufficient balance is desired. Moreover, it is comparatively expensive from containing a metal with the rare fluorescent substance (YAG) used with above luminescence equipment, consequently is that the manufacturing cost of luminescence equipment increases. Furthermore, adjustment of the color mixture of the light of a light emitting device and the light of a fluorescent substance is difficult, and hard to manufacture the luminescence equipment of the fixed luminescent color. [are stabilized and] That is, it is necessary to make regularity thickness of the fluorescent substance layer which needs to carry out wavelength conversion of a fixed quantity of the light with a fluorescent substance in order to obtain the fixed luminescent color, therefore is prepared in the direction of light emission of a light emitting device in the configuration of the above-mentioned conventional example. However, since formation of a fluorescent substance layer is performed by dropping the light transmission nature ingredient of fluorescent substance content at the cup section etc. after it lays a light emitting device in a leadframe, it is difficult to control the thickness with a sufficient precision.
[0004]
[Means for Solving the Problem] this invention persons hit on an idea in the following configurations, as a result of inquiring wholeheartedly that at least one of the above objects should be attained. that is, it is characterized by what this

invention is equipped with the light emitting device in the range whose luminescence wavelength is 360nm - 550nm, and the fluorescent substance which consists of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+, and wavelength conversion of a part of light of said light emitting device is carried out with said fluorescent substance, and is emitted -- and it comes out. [luminescence]

[0005] According to the above-mentioned configuration, the luminescence equipment by new combination of using the light emitting device which has a specific emission peak wavelength, and the fluorescent substance which consists of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+ is offered. Moreover, the fluorescent substance of the above-mentioned configuration is excited by light with a wavelength of 360nm - 550nm, and emits light at high effectiveness in the light of long wavelength from excitation light. Therefore, the luminescence equipment of the above-mentioned configuration has high luminous efficiency. Furthermore, the presentation of the parent consists of calcium, aluminum, Si, O, and N, and the fluorescent substance of the above-mentioned configuration can be said to be able to manufacture with a general and cheap ingredient as compared with the fluorescent substance (YAG) used in the conventional example. Therefore, the low luminescence equipment of a manufacturing cost is offered.

[0006]

[Embodiment of the Invention] What a light emitting device has in the range the luminescence wavelength of whose is 360nm - 550nm is used. As for the light of this wavelength range, it is possible to excite the below-mentioned fluorescent substance and to make it emit light with a well head. In selection of a light emitting device, the excitation peak of the below-mentioned fluorescent substance and the luminescent color, and the color of the light which emits light from the whole luminescence equipment in a list are taken into consideration. If it is going to obtain luminescence of a white system, the light emitting device which has used the light emitting device in the range whose luminescence wavelength is 450nm - 550nm in the range whose luminescence wavelength is 450nm - 500nm desirable still more preferably will be used. If the light emitting device from which luminescence wavelength (luminescent color) differs is used, the color of the light emitted from luminescence equipment can be changed.

[0007] Especially the formation ingredient of a light emitting device is not limited. A light emitting device equipped with an III group nitride system compound semiconductor layer, i.e., an III group nitride system compound semiconductor light emitting device, can be used suitably. An III group nitride system compound semiconductor is expressed with AlXGaYIn1-X-YN (0<=X<=1, 0<=Y<=1, 0 <=X+Y<=1) as a general formula, and includes the so-called 3 yuan system of the so-called 2 yuan system of AlN, GaN, and InN, AlxGa1-xN, AlxIn1-xN, and GaxIn1-xN (it sets above and is 0< x<1). Boron (B), a thallium (Tl), etc. may permute some III group elements, and Lynn (P), an arsenic (As), antimony (Sb), a bismuth (Bi), etc. can permute some nitrogen (N). As for the component functional division of a light emitting device, it is desirable to constitute from an above-mentioned 2 yuan system or an III group nitride system compound semiconductor of a 3 yuan system.

[0008] An III group nitride system compound semiconductor may contain the dopant of arbitration. Si, germanium, Se, Te, C, etc. can be used as an n mold impurity. As a p mold impurity, Mg, Zn, Be, calcium, Sr, Ba, etc. can be used. In addition, after doping p mold impurity, an III group nitride system compound semiconductor is exposable to electron beam irradiation, a plasma exposure, or heating at a furnace. An III group nitride system compound semiconductor can be formed by the molecular-beam crystal growth method (MBE law) of common knowledge besides metal-organic chemical vapor deposition (MOCVD law), halide system vapor growth (HVPE law), the spatter, the ion plating method, a cascade shower method, etc.

[0009] Although the construction material of the substrate into which an III group nitride system compound semiconductor layer is grown up will not be limited especially if an III group nitride system compound semiconductor layer is grown up, sapphire, a spinel, silicon, carbonization silicon, a zinc oxide, gallium phosphide, gallium arsenide, a magnesium oxide, manganese oxide, an III group nitride system compound semiconductor single crystal, etc. can be mentioned as an ingredient of a substrate, for example. Especially it is desirable to use silicon on sapphire, and it is still more desirable to use the a-th page of silicon on sapphire. In addition, in addition to the above-mentioned light emitting device, the light emitting device which does not excite the below-mentioned fluorescent substance can also be used, and, thereby, the luminescent color of luminescence equipment can be changed or adjusted.

[0010] As a fluorescent substance, calcium-aluminum-Si-O-N system oxy-night RAIDO (calcium-aluminum-Si-O-N:Eu2+) which carried out activation of Eu2+ is used. This fluorescent substance has an excitation peak in about 300nm and about 490nm, and has a luminescence peak in the range of about 580nm - about 700nm. Therefore, it excites by the light (a luminescence peak is in the range of 360nm - 550nm) of the above-mentioned light emitting device, and light is emitted in the light of long wavelength from excitation light. Since especially about 490nm excitation peak is well in agreement with the wavelength of the light of a blue system, it can change the light from the light emitting device

concerned efficiently by combining with the III group nitride system compound semiconductor light emitting device which carries out luminescence of a blue system. On the other hand, the emission spectrum of this application fluorescent substance has a luminescence peak in about 580nm - about 700nm as mentioned above, and the light emitted from a fluorescent substance has the color of an orange system - red system. Therefore, luminescence of a white system with very high color rendering properties with a rich red component is obtained by combining the light emitting device and the fluorescent substance concerned of a blue system, and mixing the light from both. A luminescence peak shifts this application fluorescent substance to a long wavelength side continuously by making the content nitrogen volume increase. Therefore, it is possible by adjusting content nitrogen volume suitably to change the luminescence wavelength (luminescent color) of a fluorescent substance.

[0011] this application fluorescent substance can be prepared as a vitreous humour or a crystalline, and anything of description can use it. The fluorescent substance of a vitreous humour or a crystalline can be processed and used for fine particles, grain, or a board. That is, various configurations can be processed, it can use for them and the degree of freedom of a configuration is high. Here, that by which irregularity and/or a curved surface are formed in the thing, the whole surface, or two or more fields a plate-like thing, the thing of the configuration which combined two or more plates, the whole surface, or two or more fields of whose are curved surfaces, a cap-like thing, a box-like thing, etc. are contained in a board. When processing and using for fine particles or grain, it is desirable to set the mean particle diameter to 20 micrometers or less. The mean particle diameter is set to 10 micrometers or less still more preferably. It considers as the mean particle diameter of 5 micrometers or less most preferably. By making the particle diameter of a fluorescent substance small, efficiently, it can absorb and wavelength conversion of the light from a light emitting device can be carried out.

[0012] As for the fluorescent substance processed into fine particles or grain, it is desirable to distribute a light transmission nature ingredient and to use. That is, being used as a fluorescent substance layer is desirable. As an ingredient of light transmission nature, an epoxy resin, silicon resin, a urea-resin, or glass is used. Two or more sorts of ingredients chosen as arbitration from these can also be used for these ingredients not to mention being used independently. The purpose of use, a service condition, etc. can be accepted and concentration distribution of the fluorescent substance in the ingredient of light transmission nature can be changed. That is, the amount of a fluorescent substance is changed continuously or gradually as a light emitting device is approached. For example, concentration of a fluorescent substance is enlarged in the part near a light emitting device. Thereby, the light from a light emitting device can be irradiated efficiently at a fluorescent substance. On the other hand, it is easy to be influenced of the heat generated in a light emitting device, and degradation of a fluorescent substance poses a problem. On the other hand, degradation of the fluorescent substance resulting from generation of heat of a light emitting device is controlled by making concentration of a fluorescent substance small as a light emitting device is approached. The layer which consists of an ingredient of the light transmission nature containing a fluorescent substance is prepared in the luminescence direction of a light emitting device. Although it is preferably formed so that the luminescence direction side of a light emitting device may be covered, the layer thru/or space which consists of another light transmission nature ingredient can also be prepared between layers and light emitting devices concerned.

[0013] By processing a desired configuration, the fluorescent substance of a vitreous humour can constitute a fluorescent substance layer from itself. Therefore, if the fluorescent substance of a vitreous humour is cast to a board, the amount of the light of the light emitting device in which wavelength conversion is carried out by the thickness of a board with a fluorescent substance can be adjusted. Thus, color mixture of the light of a fluorescent substance and the light of a light emitting device can be adjusted in an easy and high precision by using the fluorescent substance of a vitreous humour.

[0014] Since this application fluorescent substance has afterglow nature, it can also make luminescence equipment emit light using this property. That is, time sharing of the light of a light emitting device and the light of a fluorescent substance can be carried out, and they can be made to emit by turning on a light emitting device intermittently. Thereby, the luminescent color of the luminescence equipment obtained by mixing with the light of a light emitting device and the light of a fluorescent substance can be adjusted. Delicate adjustment of the color tone of the light of the white system which emits light from luminescence equipment is attained by adjusting the luminescence time amount especially using the light emitting device of a blue system. What is necessary is just to drive a light emitting device according to pulse current, in order to make a light emitting device turn on intermittently. For example, if a full wave rectifier circuit or a half wave rectifier circuit is used, a light emitting device can be driven, using alternating current directly.

[0015] The location where the light of a light emitting device is irradiated is equipped with this application fluorescent substance, and it emits light by the light of a light emitting device. That is, wavelength conversion of a part of light of a light emitting device is carried out with a fluorescent substance. Thereby, the light of different wavelength (luminescent color) from the light of a light emitting device arises. And it will be mixed with the light by which wavelength

conversion is not carried out with a fluorescent substance, and this light by which wavelength conversion was carried out will be emitted. Therefore, as the whole luminescence equipment, luminescence of a different color from the light of a light emitting device is obtained. In addition, the luminescent color can be changed by changing the presentation of a fluorescent substance. It can have and the luminescent color of the whole luminescence equipment can be adjusted.
[0016] As mentioned above, a fluorescent substance is distributed in the layer which consists of a light transmission nature ingredient, and, in a configuration of that the light from a light emitting device passes the layer concerned, the light of a light emitting device and the light of a fluorescent substance are automatically mixed in the layer concerned. However, the mode which mixes the light of a light emitting device and the light of a fluorescent substance is not limited above. For example, a fluorescent substance is arranged to island shape around a light emitting device. A part of light of a light emitting device can pass through between the islands of a fluorescent substance, and it can mix this light and light from a fluorescent substance for example, in a closure member. Moreover, a fluorescent substance is arranged in the location from which it separated from the optical axis of a light emitting device in luminescence equipment, it condenses and has the light from a fluorescent substance in it in the direction of an optical axis using a reflecting plate etc., and you may make it mix the light from a light emitting device, and the light from a fluorescent substance.
[0017]
[Example] An example explains the configuration of this invention to a detail more below.
(Example 1) Drawing 1 is drawing showing the shell mold LED 1 which is the example of 1 of this invention. LED1 can carry out luminescence of a white system, can use it for the source of sheet-like light, and a linear light source combining a transparent material, and can be used for various displays etc. The sectional view of the light emitting device 10 used for LED1 is shown in drawing 2 . The luminescence wavelength of a light emitting device 10 is about 480nm, and the spec. of each class is as follows.
Layer : Presentation: Dopant (thickness)
p type layer 15 : p-GaN:Mg (0.3 micrometers)
Luminous layer 14 : Superstructure Quantum well layer : In0.15Ga0.85N (3.5nm)
Barrier layer : GaN (3.5nm)
The number of repeats of a quantum well and a barrier layer: 1-10n type layer 13 : n-GaN:Si (4 micrometers)
Buffer layer 12 : AlN (10nm)
Substrate 11 : Sapphire (300 micrometers)
[0018] a buffer layer 12 is used in order to grow up the semi-conductor layer of high quality -- having -- well-known MOCVD -- it is formed on substrate 11 front face of law etc. Although AlN was used as a buffer layer in this example it is limited to this -- ******** -- the duality of GaNInN -- a system and the III group nitride system compound semiconductor (ternary system) generally expressed with AlxGayN (0< x<1, 0< y<1, x+y=1) -- The III group nitride system compound semiconductor (4 yuan system) furthermore expressed with AlaGabIn1-a-bN (0< a<1, 0< b<1, a+b<=1) can also be used.
[0019] each semi-conductor layer -- well-known MOCVD -- it is formed of law. In this grown method, ammonia gas and the alkyl compound gas of an III group element, for example, trimethylgallium, (TMG), trimethylaluminum (TMA), and trimethylindium (TMI) are supplied on the substrate heated by suitable temperature, a pyrolysis reaction is carried out, it has, and a desired crystal is grown up on a buffer layer 12. of course, the thing by which the formation approach of each semi-conductor layer is limited to this -- it is not -- well-known MBE -- it can form also by law.
[0020] The n cladding layer 13 can be made into the two-layer structure which consists of a low concentration-of-electrons n-layer by the side of a luminous layer 14, and a high concentration-of-electrons n+ layer by the side of a buffer layer 12. The latter is called n mold contact layer. As structure of a luminous layer, a luminous layer 14 may not be limited to the thing of a superstructure, but may be a terrorism mold and a gay assembling die in a terrorism mold and double to a single. In addition, a luminous layer can also be constituted using MIS junction and PIN junction.
[0021] The large AlXGaYIn1-X-YN (0<=X<=1, 0<=Y<=1, X+Y<=1) layer of the band cap which doped acceptors, such as magnesium, can be made to intervene between a luminous layer 14 and p type layer 15. This is for preventing that the electron poured in into the luminous layer 14 is spread in p type layer 15. p type layer 15 can be made into the two-layer structure which consists of a low hole concentration p-layer by the side of a luminous layer 14, and a high hole concentration p+ side of the p electrode 18. The latter is called p mold contact layer.
[0022] After the n electrode 19 consists of two-layer [of aluminum and V] and forms p type layer 15, it removes a part of p type layer 15, luminous layer 14, and n type layer 13 by etching, and is formed on n type layer 13 of vacuum evaporationo. The translucency electrode 17 is a thin film containing gold, it covers the substantial whole surface of the top face of p type layer 18, and a laminating is carried out. The p electrode 18 also consists of ingredients containing gold, and it is formed on the translucency electrode 17 of vacuum evaporationo. After forming each semi-conductor

layer and each electrode according to the above-mentioned process, the separation process of each chip is performed.
[0023] A reflecting layer can also be prepared between a luminous layer 14 and substrates 11 or in the field in which the semi-conductor layer of a substrate 11 is not formed. By preparing a reflecting layer, it is generated in a luminous layer 14, and the reflected thing to the direction of ejection of light can do efficiently light which went to the substrate side, consequently improvement in luminous efficiency can be aimed at. Drawing 3 and drawing 4 show the light emitting devices 100 and 101 equipped with a reflecting layer, respectively. In addition, in light emitting devices 100 and 101, the same sign is given to the same member as a light emitting device 10. In a light emitting device 100, a reflecting layer 25 is formed directly under a luminous layer 14. A reflecting layer 26 is formed in the field in which the semi-conductor layer of a substrate 11 is not formed in a light emitting device 101. A reflecting layer 25 is formed with a metal nitride. Preferably, one kind chosen from titanium nitride, zirconium nitride, and tantalum nitride or two kinds or more are chosen and used for arbitration. A reflecting layer 26 can be formed with a metal nitride like a reflecting layer 25. Moreover, a reflecting layer 26 can also be formed using the alloy which consists of two or more sorts of metals chosen as arbitration the simple substance of metals, such as aluminum, In, Cu, Ag, Pt, Ir, Pd, Rh, W, Mo, Ti, and nickel, or out of these.
[0024] A light emitting device 10 is mounted on the cup section 33 prepared in a leadframe 30 by adhesives 20. Adhesives 20 are the silver pastes with which silver was mixed as a filler in the epoxy resin. Stripping of the heat from a light emitting device 10 becomes good by using this silver paste. In addition, it may change to a silver paste and other well-known adhesives may be used.
[0025] The cup section 33 is filled up with the epoxy resin (henceforth "fluorescent substance resin") 35 which distributed the fluorescent substance 36 uniformly. The cup section 33 can also be filled up with the epoxy resin which contains this fluorescent substance 36 after the below-mentioned wirebonding. Moreover, before mounting a light emitting device 10 on the cup section 33, the layer containing a fluorescent substance 36 may be formed in the front face of a light emitting device 10. For example, by dipping a light emitting device 10 into the epoxy resin containing a fluorescent substance 36, a fluorescent substance resin layer is formed in the front face of a light emitting device 10, a silver paste is used for the cup section 33, and a light emitting device 10 is mounted on it after that. As the formation approach of a fluorescent substance resin layer, it is based on the above-mentioned DIP, and also sputtering, spreading, or paint can also be used.
[0026] The cup section 33 may not be filled up with fluorescent substance resin, but the configuration which prepares the layer which consists of fluorescent substance resin in the front face of a light emitting device 10 or the front face of a light emitting device 10, and the front face of the cup section 33 may be adopted. The grain (mean particle diameter of 5 micrometers) of the calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+ was used for the fluorescent substance 36. This fluorescent substance was prepared as follows. first, it becomes a predetermined ratio as a start raw material about a metallic oxide (CaCO3, aluminum2 O3, SiO2), and AlN and Eu 2O3 -- as -- weighing capacity -- it mixes and wraps in a molybdenum foil. A high-frequency-induction-heating furnace is used, it fuses and this is made to react at 1600 degrees C - 1800 degrees C under Ar ambient atmosphere for 2 hours. Grain-like calcium-aluminum-Si-O-N system oxy-night RAIDO glass is obtained by quenching after a reaction. It grinds until it becomes desired mean particle diameter at the last.
[0027] An epoxy resin is made to distribute the fluorescent substance 36 prepared as mentioned above. Although the epoxy resin was used in this example as a base material which distributes a fluorescent substance 36, it is not necessarily limited to this and transparent ingredients, such as silicon resin, a urea-resin, or glass, can be used. Moreover, although considered as the configuration which distributes a fluorescent substance 36 uniformly in fluorescent substance resin 35 in this example, dip can also be established in concentration distribution of a fluorescent substance 36 within fluorescent substance resin 35. For example, two or more fluorescent substance resin layers from which fluorescent substance 36 concentration differs using the epoxy resin with which fluorescent substance 36 concentration differs are formed in the cup section 33. Moreover, fluorescent substance 36 concentration can also be changed continuously.
[0028] The dispersing agent which becomes fluorescent substance resin 35 from titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. can also be included. By including a fluorescent substance 36 in the below-mentioned closure resin 50, fluorescent substance resin 35 is also omissible. That is, it will fill up with the closure resin 50 containing a fluorescent substance 36 also in the cup section 33 in this case. Also in this case, dip can be prepared in closure resin 50 like the case in the above-mentioned fluorescent substance resin 35 at concentration distribution of a fluorescent substance 36.
[0029] Wirebonding of the p electrode 18 and the n electrode 19 of a light emitting device 10 is carried out to leadframes 31 and 30 with wires 41 and 40, respectively. Then, a part of light emitting devices 10, leadframes 30 and 31, and wires 40 and 41 are closed by the closure resin 50 which consists of an epoxy resin. Although especially definition will not be

carried out if the ingredient of closure resin 50 is transparent, others, silicon resin, a urea-resin, or glass is used suitably. [epoxy resin] Moreover, it is desirable to be formed with the same ingredient as the ingredient of fluorescent substance resin 35 from viewpoints, such as an adhesive property with fluorescent substance resin 35 and a refractive index.
[0030] Although closure resin 50 is formed for the object, such as protection of component structure, it can give the lens effectiveness to closure resin 50 by changing the configuration of closure resin 50 according to an object. For example, it can fabricate in an others and concave lens mold or a convex lens mold etc. [mold / which is shown in drawing 1 / shell] Moreover, it can see from [of light] ejection (it sets to drawing 1 and is the upper part), and the configuration of closure resin 50 can be made into circular, an ellipse form, or a rectangle. A fluorescent substance 36 can be distributed not only when the above-mentioned fluorescent substance resin 35 is omitted, but in closure resin 50. Moreover, a dispersing agent can be included in closure resin 50. The directivity of the light from a light emitting device 10 can be made to ease by using a dispersing agent. As a dispersing agent, titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. are used. Furthermore, a coloring agent can also be included in closure resin 50. A coloring agent is used in order that a fluorescent substance may prevent that a characteristic color is shown in the burning condition or putting-out-lights condition of a light emitting device 10. Furthermore, when the light from a light emitting device 10 contains many wavelength of an ultraviolet-rays field, reinforcement can be attained by including an ultraviolet ray absorbent in closure resin 50. In addition, a fluorescent substance 36, a dispersing agent, a coloring agent, and an ultraviolet ray absorbent are independent, or can choose two or more from these as arbitration, and can be made to contain it in closure resin 50.
[0031] In LED1 constituted as mentioned above, wavelength conversion of a part of blue glow emitted from a light emitting device 10 is carried out with a fluorescent substance 36. A part of this light by which wavelength conversion was carried out and blue glow of a light emitting device 10 are mixed, and external radiation is carried out, consequently luminescence of a white system is obtained from LED1.
[0032] As the actuation approach of LED1, it can drive according to pulse current. Thereby, the light of a light emitting device 10 and the light of a fluorescent substance 36 carry out time sharing, are emitted, and can aim at adjustment of the luminescent color of LED1. For example, the full wave rectifier circuit (a) and half wave rectifier circuit (b) which are shown in drawing 5 are connected to LED1, and alternating current is supplied.
[0033] In addition to the above-mentioned light emitting device 10, other light emitting devices can also be used collectively. As other light emitting devices, a light emitting device 10 and the light emitting device from which luminescence wavelength differs are used. The light emitting device which has preferably the luminescence wavelength which a fluorescent substance 36 is excited [wavelength] substantially and does not make it emit light is used. By using other starting light emitting devices, the luminescent color of LED1 can be changed or can be adjusted. Moreover, a brightness rise can also be aimed at, using a light emitting device 10 two or more.
[0034] In LED1, the substrate side of a light emitting device 10 can be established for the wrap fluorescent substance layer 37, and fluorescent substance resin 35 can also be omitted so that it may be shown drawing 6 . Drawing 6 (a) is an example of a wrap only about the substrate front face of a light emitting device 10 in the fluorescent substance layer 37, and this drawing (b) is an example of a wrap in the fluorescent substance layer 37 about the front face of a substrate, and the side face of a light emitting device 10. According to the mode of drawing 6 (b), wavelength conversion of the light emitted to a longitudinal direction from the side face of a light emitting device 10 can be carried out with a fluorescent substance 36. As a fluorescent substance layer 37, the light transmission nature ingredients (for example, an epoxy resin, silicon resin, a urea-resin, or glass etc.) which distributed the fluorescent substance 36 can be used. In this case, for example, the fluorescent substance layer 37 can be formed by dipping the substrate side of a light emitting device 10 into this light transmission nature ingredient. Moreover, it can form by sputtering using the light transmission nature ingredient which distributed the fluorescent substance 36, spreading, or paint.
[0035] It can also form by what processed into the board the vitreous humour (henceforth "fluorescent glass") of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+ for the fluorescent substance layer 37. In the case of drawing 6 (a), it is formed by the following approaches. That is, in the production process of a light emitting device 10, after forming each semi-conductor layer on a substrate, plate-like fluorescent glass is pasted up on a substrate side side, and it is the approach of dividing into each chip. Moreover, the approach using the substrate which pasted up fluorescent glass on the rear-face side of the field into which a semi-conductor layer is grown up beforehand is also employable. Furthermore, after manufacturing a light emitting device 10, the approach of pasting up the fluorescent glass plate of desired magnitude on the substrate side of a light emitting device 10 may be adopted. Similarly in the case of drawing 6 (b), the fluorescent glass cast in the desired configuration can be prepared, the substrate side of a light emitting device 10 can be inserted in to this, and the fluorescent substance layer 37 can be formed. A light emitting device 10 and fluorescent glass may be pasted up using adhesives in that case.

[0036] In LED1, a planar type Zener light emitting device can also be used as a light emitting device. The example which used the planar type Zener light emitting device 60 for drawing 7 is shown. In addition, drawing 7 </A> is the enlarged drawing of cup section 33 part of the mounting lead 30. A light emitting device 60 deletes electrodes 17, 18, and 19 from the light emitting device 10 shown in drawing 2 , and fixes this to the form of a flip chip on a silicon substrate 70. The p mold GaN contact layer 15 of a light emitting device 10 is connected to p mold field of a silicon substrate 70 through the metal-electrode layer 71. Although the ingredient of this metal-electrode layer 71 will not be limited especially if ohmic contact is obtained between a silicon substrate 70 and the p mold GaN contact layer 15, a gold alloy etc. can be used, for example. The n mold GaN contact layer 13 of a light emitting device 10 is connected to n mold field of a silicon substrate 70 through a metal electrode 72. Although the ingredient of this metal-electrode layer 72 will not be limited especially if ohmic contact is obtained between a silicon substrate 70 and the n mold GaN contact layer 13, aluminum alloy etc. can be used, for example. p mold part of a silicon substrate 70 is connected to a leadframe 31 by the wire 41.

[0037] When using such a planar type Zener light emitting device 60, it fills up with the fluorescent substance resin 35 which made the cup section 33 distribute a fluorescent substance 36. Moreover, the fluorescent substance resin 35 of the cup section 33 may be omitted, and the closure member 50 may be made to contain a fluorescent substance 36 like the case where the above-mentioned light emitting device 10 is used. Furthermore, the fluorescent substance layer 38 which covers the substrate front face of a light emitting device 60 as shown in drawing 8 can also be formed. Drawing 8 (a) is an example of a wrap only about a substrate front face in the fluorescent substance layer 38, and this drawing (b) is an example of a wrap in the fluorescent substance layer 38 about the front face of a substrate, and the side face of a light emitting device 60. According to the mode of drawing 8 (b), wavelength conversion of the light emitted to a longitudinal direction from the side face of a light emitting device 60 can be carried out with a fluorescent substance 36. Drawing 8 (a) and the fluorescent substance layer 38 of (b) can be formed by the same approach using the same ingredient as the above-mentioned fluorescent substance layer 37, respectively.

[0038] (Example 2) Drawing 9 is the sectional view of the chip mold LED 2 which are other examples of this invention. The same sign is given to the same member as LED1 of an example 1, and the explanation is omitted. Luminescence of a white system can be carried out like [LED2] an example 1, for example, it can use for the source of sheet-like light, and a linear light source combining a transparent material, and can use for various displays etc. A light emitting device 10 uses a silver paste etc. for a substrate 80, and is fixed to it. Wires 40 and 41 connect each electrode of a light emitting device 10 to the electrodes 81 and 82 in which it was prepared by the substrate 80, respectively. A sign 90 is a reflecting plate formed in the perimeter of a light emitting device, and the front face is mirror-plane-ized.

[0039] The cup-like part formed with a substrate 80 and a reflecting plate 90 is filled up with closure resin 85. A light emitting device 10 and wires 40 and 41 are covered with closure resin 85. Closure resin 85 consists of fluorescent substance resin which made transparent base materials, such as an epoxy resin, silicon resin, or a urea-resin, distribute a fluorescent substance 36 uniformly. Closure resin 85 is formed by approaches, such as potting and printing. In LED2 constituted as mentioned above, in case a part of light of a light emitting device 10 passes closure resin 85, the part is absorbed by the fluorescent substance 36 and wavelength conversion of it is carried out. This light by which wavelength conversion was carried out, and the light which penetrates closure resin 85, without being absorbed by the fluorescent substance 36 carry out color mixture, and luminescence of a white system is obtained as a whole.

[0040] Although considered as the configuration which fills up with the configuration of drawing 9 the closure resin 85 which consists of fluorescent substance resin into the cup-like part formed by the substrate 80 and the reflecting plate 90, the layer 39 (fluorescent substance layer) which consists of fluorescent substance resin may be formed in the front face of a light emitting device 10 like drawing 10 , and the configuration which carries out the laminating of the light transmission nature resin 86 on it may be adopted. For example, after mounting a light emitting device 10 on a substrate 80, the fluorescent substance layer 39 is formed by approaches, such as vacuum evaporationo, sputtering, spreading, and paint. The light transmission nature resin layer 86 can be formed by the same approach as the above-mentioned closure resin 85. According to such a configuration, by designing the thickness of a fluorescent substance layer suitably, the amount of the light by which is emitted from a light emitting device 10 and wavelength conversion is carried out with a fluorescent substance 36 can be adjusted, it has, and the luminescent color of LED2 is adjusted. Moreover, the layer containing a fluorescent substance 36 is covered with the light transmission nature resin layer 86, and protection of a fluorescent substance 36 is achieved.

[0041] In addition, the closure resin 65 of LED2 of drawing 9 and a list can be made to contain like the case of LED1 of an example 1 combining either a dispersing agent, a coloring agent and an ultraviolet ray absorbent and 2 or more in the fluorescent substance layer 39 of LED3 of drawing 10 , and the light transmission nature ingredient layer 86.

[0042] In LED2 of drawing 9 , the configuration which omitted the reflecting plate 90 is also employable. The chip mold

LED 4 of this configuration is shown in drawing 11 . The same sign is given to the same member as LED2. After the closure member 87 of LED4 consists of an epoxy resin which distributed the fluorescent substance 36 and mounts a light emitting device 10 on a substrate 80, it can be formed by mold molding which serves as a desired configuration. The configuration (chip mold LED 5) which similarly omitted the reflecting plate 90 in LED3 of drawing 10 as shown in drawing 11 is also employable. The fluorescent substance layer 88 can be formed like the fluorescent substance layer 39 of LED3, and can form the light transmission nature resin layer 89 as well as the light transmission nature resin layer 86 of LED3.

[0043] In the above-mentioned chip molds 2-LED 5, the light emitting device 10 which equips a substrate front face with the fluorescent substance layer 38 of drawing 6 can be used. Moreover, the planar type Zener light emitting device 60 of drawing 8 can also be used. In the chip mold 2 and LED 4, the closure member 85 and the fluorescent substance 36 in 87 can be omitted in these cases, and the fluorescent substance layers 39 and 88 can be omitted in the chip mold 3 and LED 5.

[0044] (Example 3) Drawing 13 is the outline block diagram of the reflective mold LED 6 which are other examples of this invention. The same sign is given to the same member as LED1 of an example 1, and the explanation is omitted. The fluorescent substance layer 112 is formed in concave surface 111 front face of a reflecting mirror 110 in the reflective mold LED 6. The fluorescent substance layer 112 consisted of an epoxy resin containing a fluorescent substance 36, and was formed by applying to a concave surface 111. Light transmission nature ingredients, such as silicon resin besides an epoxy resin and a urea-resin, can also be used. The formation approach of the fluorescent substance layer 112 is not limited to spreading, either, and may adopt approaches, such as vacuum evaporationo and paint. In addition, a fluorescent substance can also be formed in the convex 113 of a reflecting mirror 110. In this case, a reflecting mirror 110 is formed with a light transmission nature ingredient, and a fluorescent substance layer front face is mirror-plane-ized further. For example, approaches, such as vacuum evaporationo and plating, are given for the layer which consists of a metal of high reflective effectiveness.

[0045] In the reflective mold LED 6 which consists of the above configuration, in case it is reflected by the reflecting mirror 110, a part of light from a light emitting device 10 is absorbed by the fluorescent substance of the fluorescent substance layer 112, and wavelength conversion is carried out. When this light by which wavelength conversion was carried out, and the light reflected without carrying out wavelength conversion are mixed, the light of a white system is emitted as a whole. In addition, you may close with a light emitting device 10 and the light transmission nature ingredient of fluorescent substance content of a reflecting mirror 110 instead of forming the fluorescent substance layer 112 in the concave surface 111 of a reflecting mirror 110. Moreover, the fluorescent substance glass of a reflecting mirror configuration can also be used. In that case, the convex of a reflecting mirror is mirror-plane-ized. The approach of mirror-plane-izing is the same as that of the above. Furthermore, a light emitting device equipped with drawing 6 or the fluorescent substance layer of drawing 8 can also be used. In this case, the fluorescent substance layer 112 on the front face of a reflecting mirror is omissible.

[0046] (Example 4) Drawing 14 is the source 7 of sheet-like light which are other examples of this invention. Drawing 14 (a) is drawing which saw the source 7 of sheet-like light from the 1 side-face side, and drawing 14 (b) is drawing seen from the top-face side (fluorescent substance layer side). The source 7 of sheet-like light can be used as back lights for liquid crystal, such as a personal computer, a cellular phone, and a Personal Digital Assistant.

[0047] The source 7 of sheet-like light consists of two or more LED115, a light guide plate 120, and a fluorescent substance layer 121. The outline configuration of LED115 was shown in drawing 15 . LED115 is LED which carries out luminescence of a blue system, and is LED which mounted the light emitting device 10 in an example 1 on the leadframe, and was closed with the epoxy resin of a desired configuration. Since the class configuration of a light emitting device 10 is as above-mentioned, the explanation is omitted.

[0048] LED115 is arranged so that the optical installation side 123 of a light guide plate 120 may be countered. Especially the number of LED115 used is not limited. Moreover, in this example, although LED115 of a shell mold was used, LED of other types (for example, chip mold) can also be used. Furthermore, the configuration of a light emitting device is not limited to the thing of this example, either, for example, a planar type Zener light emitting device can also be used.

[0049] A light guide plate 120 consists of an ingredient of light transmission nature, and is equipped with the optical installation side 123 and the luminescence side 125. In this example, methacrylic resin was used as the ingredient. Other light transmission nature ingredients, such as a polycarbonate, can also be used. A light guide plate 120 can also be made to contain a light diffusion agent. Moreover, it is desirable to cover fields other than optical installation side [of a light guide plate 120] 123 and luminescence side 125 with the reflective film thru/or a reflecting layer, and to prevent leakage of the light out of a light guide plate 120. For example, surface roughening can be performed to fields other than optical

installation side 123 and luminescence side 125, and the front face can be made into light reflex nature. As the approach of surface roughening, etching, sandblasting, an electron discharge method, etc. are mentioned, for example. Moreover, white printing may be performed instead of surface roughening, or a white tape may be stuck, and a light reflex layer may be formed. It is desirable that the consistency is continuous or to form so that it may become large gradually as a light reflex layer is formed in a low consistency in a near field from LED115 and keeps away from LED115. In the field where the distance from LED115 is distant, echo of an efficient light and diffusion are performed by this, consequently bleedoff of a uniform light is acquired over the luminescence side 125 whole regardless of the distance from LED115.
[0050] In this example, although one side face was made into the optical installation side 123, two or more optical installation sides can also be established. That is, LED115 can be arranged in the location which counters to two or more fields of a light guide plate 120, respectively, and light can be introduced from two or more fields concerned. According to this configuration, the quantity of light rise of the sheet-like light acquired is achieved. Moreover, the light emission from the luminescence side of the larger range becomes possible. Furthermore, the quantity of light of the light emitted can be equalized more over the whole luminescence side.
[0051] The fluorescent substance layer 121 is a layer which consists of an epoxy resin which distributed the fluorescent substance 36 and the light diffusion agent, and it is formed so that the luminescence side 125 of a light guide plate 120 may be covered. It can replace with an epoxy resin and methacrylic resin, polycarbonate resin, etc. can also be used. The grain (mean particle diameter of 5 micrometers) of the calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+ was used for the fluorescent substance 36. Titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. are used for a light diffusion agent. Although the fluorescent substance layer 121 was formed in this example so that the luminescence side 125 might be covered directly, the layer which consists of space or a transparent ingredient may be prepared between the luminescence side 125 and the 1st fluorescent substance layer 121. In addition, a coloring agent can be included in a light guide plate 120 and/or the fluorescent substance layer 121, and color correction can be performed. Moreover, light diffusion agents, such as titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, and barium titanate, can also be included in a light guide plate 120 like the fluorescent substance layer 121.
[0052] In the source 7 of sheet-like light constituted as mentioned above, the blue glow emitted from LED115 is first introduced from the optical installation side 123 to a light guide plate 120. And the inside of a light guide plate 120 is progressed, and it emanates from the luminescence side 125 after that. A part of emitted light is absorbed by the fluorescent substance 36 in the fluorescent substance layer 121, and wavelength conversion is carried out. The sheet-like light of a white system will be emitted from fluorescent substance layer 121 top face by mixing this light by which wavelength conversion was carried out, and the blue glow by which wavelength conversion is not carried out with a fluorescent substance. Since the fluorescent substance layer 121 is made to distribute a light diffusion agent, mixing of the light in the fluorescent substance layer 121 is promoted, and homogenization of light is attained.
[0053] It can replace with the fluorescent substance layer 121, and what processed into the board the fluorescent substance (calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+) can also be used. That is, it considers as the configuration which laid tabular fluorescent glass in the luminescence side 125 of a light guide plate 120. Fluorescent glass and a light guide plate 120 may be pasted up with the adhesives which consist of a light transmission nature ingredient. Moreover, the sheet (for example, PET film) which consists of a light transmission nature ingredient can also be installed among both. Moreover, the fluorescent substance layer 121 is omissible by making a light guide plate 120 distribute a fluorescent substance. Furthermore, the fluorescent substance layer 121 may be omitted by using what processed fluorescent glass into tabular as a light guide plate 120. In addition, the light of the white system from which a color tone differs can be made to emit light by using LED of different luminescence wavelength from LED115. By also being able to use LED of different luminescence wavelength from this in addition to LED115, and controlling the burning condition of such LED, amendment of the luminescent color and adjustment can be performed and various colors can be made into the source of sheet-like light which can emit light.
[0054] (Example 5) The source 8 of sheet-like light of a mode which is different from the above-mentioned example in drawing 16 was shown. The same sign is given to the same member as the above-mentioned source 7 of sheet-like light, and the explanation is omitted. In the source 8 of sheet-like light, the fluorescent substance layer 127 is arranged between LED115 and the optical installation side 123 of a light guide plate 120. The fluorescent substance layer 127 is the same configuration as the fluorescent substance layer 121 in the above-mentioned source 7 of sheet-like light. It is the same as that of the case of the source 7 of sheet-like light that the layer of space or light transmission nature may be prepared between the fluorescent substance layer 127 and the optical installation side 123 of a light guide plate 120.
[0055] In the source 8 of sheet-like light constituted as mentioned above, a part of blue glow emitted from LED115 is absorbed by the fluorescent substance 36 in the fluorescent substance layer 127, and wavelength conversion is carried

out. This light by which wavelength conversion was carried out, and the blue glow by which wavelength conversion is not carried out with a fluorescent substance are mixed, and it is introduced into a light guide plate 120 from the optical installation side 123. External radiation of the light which progressed the inside of a light guide plate 120 is carried out as sheet-like light of a white system more nearly eventually than the luminescence side 125. In addition, mixing of light is performed also within a light guide plate 120.

[0056] (Example 6) Drawing 17 shows the source 9 of sheet-like light which used the color conversion filter 130. A color conversion filter 130 consists of a color conversion sheet 135 and a transparent material layer 137. The same sign is given to the same member as the member in the above-mentioned example, and the explanation is omitted. The color conversion sheet 135 forms the fluorescent substance layer 131 in one side of the transparence sheet 132 which consists of light transmission nature resin. The fluorescent substance layer 131 makes transparent base materials, such as an epoxy resin, silicon resin, or a urea-resin, distribute a fluorescent substance 36. PET was used for the ingredient of the transparence sheet 132. It is desirable to prepare detailed irregularity in the front face of the fluorescent substance layer 131. It is for preventing that improve the top face (front face of the fluorescent substance layer 131) of the color conversion sheet 135, and concordance with the glass installed on the color conversion sheet 135, and a blot comes out in an interface. Moreover, it is desirable to prepare detailed irregularity also in an adhesion side with the transparent material layer 137 of the transparence sheet 132. It is for preventing adhesion with the color conversion sheet 135 and the transparent material layer 137, and preventing that a blot comes out in an interface.

[0057] The transparent material layer 137 is a product made of an epoxy resin. Of course, the transparent material layer 137 can also be formed with the transparent resin of others, such as silicon resin, etc. The reflective film 139 is formed in the underside of the transparent material layer 137, and the leakage of the light from transparent material layer 137 underside is prevented. Especially the construction material of a reflecting layer 139 is not limited. It is desirable to prepare the same reflecting layer also as side faces other than the field where LED115 counters and is arranged. It is for preventing the leakage of the light from this side face. A reflecting layer 139 is also omissible.

[0058] LED115 is installed in the location which counters the side face of a color conversion filter 130. LED115 can also be installed in the location which counters the underside of a color conversion filter 130. In this case, a reflecting layer 139 is not formed in the underside concerned. The light-emission mode in the source 9 of sheet-like light constituted as mentioned above is as follows. First, the light from LED115 is introduced from the side face of the transparent material layer 137, and is taken out from the field by the side of the color conversion sheet 135 (top face). In case a part of this light passes the fluorescent substance layer 131, wavelength conversion of it is carried out with a fluorescent substance 36. By carrying out color mixture of this light by which wavelength conversion was carried out, and the light by which wavelength conversion is not carried out with a fluorescent substance 36, the light of a white system is emitted from the top face of the color conversion sheet 135 as a whole.

[0059] In addition, the light of the white system from which a color tone differs can be made to emit light by using LED of different luminescence wavelength from LED115. Moreover, by also being able to use LED of different luminescence wavelength from this in addition to LED115, and controlling the burning condition of such LED, amendment of the luminescent color and adjustment can be performed and various colors can be made into the source of sheet-like light which can emit light.

[0060] (Example 7) Drawing 18 is drawing having shown cap type LED140. The same sign is given to the same member as the member in the above-mentioned example, and the explanation is omitted. LED140 is constituted by putting the cap 145 which consists of light transmission nature resin which distributed the fluorescent substance 36 on the front face of the closure resin 50 of LED115 in an example 4. Cap 145 can cast the light transmission nature resin containing a fluorescent substance 36 in the shape of a cap, and can form it by putting this on closure resin 50. Moreover, after forming closure resin 50, it can also form by die forming etc. As an ingredient of cap 145, the epoxy resin was used by this example. Thermoplastics, such as thermosetting resin, such as a urea-resin, and polyethylene, etc. can also be used. The dispersing agent which becomes cap 145 from titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. can also be included.

[0061] Thus, in constituted LED140, in case a part of light emitted from the light emitting device 10 passes cap 145, wavelength conversion of it is carried out with a fluorescent substance 36. This light by which wavelength conversion was carried out, and the light of the blue system which was not changed into a fluorescent substance 36 are mixed, consequently external radiation of the light of a white system is carried out from cap 145 front face.

[0062] (Example 8) Other examples of application of this invention were shown in drawing 19 - drawing 24 . Hereafter, the luminescence equipment of each drawing is explained. In addition, the same sign is given to the same member as the member in the above-mentioned example, and the explanation is omitted. Electric bulb type light equipment 150 is shown in drawing 19 , and an outline configuration is carried out from a light emitting device 10, and fluorescent glass

151 and the case section 152. A current is supplied to a light emitting device 10 through the case section 152. fluorescent glass 151 shows in drawing the calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+ -- as -- hollow abbreviation -- it casts spherically. With luminescence equipment 150, in case the light emitted from the light emitting device passes fluorescent glass 151, the part is absorbed by the fluorescent substance and wavelength conversion is carried out. External radiation of this light by which wavelength conversion was carried out, and the light of the light emitting device which penetrates fluorescent glass is mixed and carried out. In addition, fluorescent glass A coloring agent and/or a light diffusion agent may be made to contain.

[0063] Fluorescent lamp type light equipment 160 is shown in drawing 20 , and an outline configuration is carried out from two or more chip molds LED 161, tubed fluorescent glass 163, and case sections 165. Each LED161 is mounted on a substrate 164. A current is supplied to each LED161 through the case section 165. About fluorescent glass 163, it is the same as that of the above-mentioned fluorescent glass 151 except a configuration. With luminescence equipment 160, in case the light emitted from each LED161 passes fluorescent glass 163, the part is absorbed by the fluorescent substance and wavelength conversion is carried out. External radiation of this light by which wavelength conversion was carried out, and the light of LED which penetrates fluorescent glass is mixed and carried out. What can emit light in the light of the range of 360-550nm wavelength is used for LED161. For example, luminescence of a white system is obtained by using the chip mold LED with a luminescence wavelength of 480nm. It can replace with the chip mold LED and the shell mold LED can also be used. Furthermore, other LED which a fluorescent substance is excited [LED] substantially and does not make it emit light can also be used together.

[0064] Braun-tube type luminescence equipment 170 is shown in drawing 21 . Luminescence equipment 170 is equipped with a light emitting device 10, a fluorescent screen 171, and the case 172 that consists of an ingredient which does not penetrate light. A fluorescent screen 171 processes into tabular fluorescent glass (calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+). With such a configuration, while wavelength conversion is carried out and the part is mixed with the light by which wavelength conversion is not carried out within a fluorescent screen 171, external radiation of the light emitted from the light emitting device 10 is carried out from the luminescence side 172 of a fluorescent screen 171 at a radial. By this, the white light of a radial will be acquired.

[0065] Projector type luminescence equipment 180 is shown in drawing 22 . Luminescence equipment 180 is equipped with LED115 and a reflecting plate 181. A reflecting plate 181 is arranged with a predetermined tilt angle to the optical axis of LED115. In this example, the reflecting plate 181 was formed with fluorescent glass (calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+). A reflecting plate 181 may be formed with a light transmission nature ingredient (for example, acrylic resin), and the layer containing a fluorescent substance (calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+) may be formed in the field which counters LED. The whole surface 182 of a reflecting plate 181 is mirror-plane-ized. For example, mirror plane processing is performed by vapor-depositing and plating the metal of a high reflection factor on the whole surface concerned etc. Thus, with the constituted luminescence equipment 180, the light emitted from LED115 results in a reflecting plate 181, and when reflected by the reflector 182, it is emitted in the predetermined direction. Wavelength conversion of a part of light of LED115 will be carried out into a reflecting plate 181, and the light which this light by which wavelength conversion was carried out, and the light by which wavelength conversion is not carried out mixed will be emitted from the luminescence side 183.

[0066] Luminescence LGT 190 which consists of LED (not shown) built in a light-emitting part 191, the grip section 192, and the grip section is shown in drawing 23 . A light-emitting part 191 is the member which processed and cast the acrylic resin which distributed the fluorescent substance 36 to the shape of a cylinder. Two kinds, the red system LED and the blue system LED, were used for LED. Each LED is connected to the control circuit and power source which are not illustrated. When the red system LED is turned on, the light of LED is emitted as it is from the front face of a light-emitting part 191. That is, a light-emitting part 191 emits light in red. On the other hand, when the blue system LED is turned on, wavelength conversion is carried out at the fluorescent substance of a light-emitting part, and the light emitted without carrying out wavelength conversion with this light by which wavelength conversion was carried out carries out color mixture of a part of light of LED, and it is emitted from light-emitting part 191 front face. Thereby, a light-emitting part 191 emits light white. For example, each LED can be turned on by turns and light can be emitted by turns in red and white. In addition, the burning mode of LED and LED which are used is not limited to this.

[0067] The display 200 which can perform character representation etc. is shown in drawing 24 . Drawing 24 (a) is drawing which found the display 200 from the screen 211 side of a display 210, and this drawing (b) is an A-A line sectional view in (a). The outline configuration of the display 200 is carried out from a display 210, LED220, and a case 230. A display 210 consists of a light transmission nature ingredient (for example, acrylic resin), and the fluorescent substance layer 215 is formed in a part of the rear face so that it may become the configuration of a desired alphabetic

character, a graphic form, etc. The fluorescent substance layer 215 is formed when spreading etc. carries out the thing which made the light transmission nature ingredient distribute a fluorescent substance 36. Moreover, the fluorescent substance layer 215 may be formed with fluorescent glass (calcium-aluminum-Si-O-N system oxy-night RAIDO glass which carried out activation of Eu2+). Furthermore, the fluorescent substance layer 215 can also be formed so that it may be embedded at a display 210, as shown in drawing 25 . LED220 is LED which carries out luminescence of a blue system.

[0068] On a display 200, the light by which external radiation of the light emitted from screen 211 part by which the fluorescent substance layer 215 is formed in the rear-face side is carried out through the fluorescent substance layer 215, i.e., the light by which wavelength conversion was carried out with the fluorescent substance, and the light by which wavelength conversion is not carried out are mixed. Therefore, the white light is emitted from the part concerned. On the other hand, the light from LED is emitted from other screen 211 parts, without carrying out wavelength conversion as it is. That is, blue glow is emitted. Thus, the parts of white and others can be displayed more blue, it has a part of screen 211, and the display of a desired alphabetic character, a graphic form, etc. can be performed.

[0069] (Example 9) Drawing 26 is the elements on larger scale of the display 210 used combining each LED of LED1 (henceforth "W-LED") and RGB of an example 1. An indicating equipment 210 can be used for a full color LED display etc. A display 210 is equipped with the display 211 of an outline rectangle, and the LED unit 212 constituted by the display 211 by each LED and W-LED of RGB is arranged in the shape of a matrix. Arrangement of each LED in the LED unit 212 can be chosen as arbitration.

[0070] Hereafter, the method of presentation of a display 210 is explained, referring to drawing 27 . The image data inputted from the input section 220 is temporarily saved for the image data storage means 230. The pattern selection circuitry which is not illustrated, an intensity modulation circuit, and a flash circuit are built in a control section 240, and the control signal which controls the burning condition of each LED unit 212 according to the image data saved for the image data storage means 230 is outputted. The brightness and color according to a control signal light up, it has each LED unit 201, and a specific configuration etc. is displayed on a display 250 by specific brightness and a specific color. In a display 210, although considered as the LED unit combining each LED and W-LED of RGB, an LED unit can be constituted only from W-LED and the display which can display the configuration of arbitration etc. can be obtained by arranging this in the shape of a matrix with a display 201 then white (W-LED is turned on), or black (W-LED is switched off). Also in this case, gradation control of the brightness of each LED unit can be carried out, and utilization is possible for the LED display of monochrome etc.

[0071] (Example 10) Drawing 28 is drawing having shown the signal 300 for cars using the chip mold LED 2. A signal 300 is equipped with a display 302 and the chip mold LED 2 is arranged in the shape of a matrix at a display 302. The sign 301 in drawing is a case. Covering of the colored transparence which is not illustrated is put on a display 302. The light of the white system which produces each LED3 when a burning condition is controlled by the control means and LED2 lights up is colored and checked by looking by passing covering of colored transparence. It can also consider as the signal which displays white by, of course using transparent and colorless covering. Supply of the power source to each LED2 is performed by connecting each LED2 juxtaposition-wise or in serial. When connecting in serial, LED2 can be divided into two or more groups, and a power source can also be supplied for every group. For example, it can consider as the display 302 by which LED has been arranged as a whole circularly by arranging each LED group so that a concentric circle may be drawn in a display. In addition, it can also carry out for every LED group also about control of a burning condition.

[0072] By using the chip mold LED 2 in the shape of a matrix, and forming the light source, light can be made to emit by uniform brightness over the whole display, and the unevenness of the brightness produced when the conventional electric bulb is used is reduced. By controlling a burning condition for every LED group as mentioned above, the display from which brightness differs selectively is also possible. In addition, the configuration method and arrangement consistency of the chip mold LED 2 can be chosen as arbitration according to the object.

[0073] This invention is not limited to explanation of the gestalt of implementation of the above-mentioned invention, and an example at all. It does not deviate from the publication of a claim but deformation modes various in the range this contractor can hit on an idea of easily are also contained in this invention.

[0074] Hereafter, the following matter is indicated.

(10) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in the cup section prepared in the leadframe, and said cup section is filled up with said light transmission nature ingredient containing said fluorescent substance for.

(11) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in the cup section prepared in the leadframe, and the fluorescent substance layer which consists of said light transmission nature

ingredient containing said fluorescent substance is prepared for in the front face of said light emitting device.
(12) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in the cup section prepared in the leadframe, and said light emitting device and said a part of leadframe are covered with said light transmission nature ingredient containing said fluorescent substance for.
(20) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in a substrate and the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance is prepared for in the front face of said light emitting device.
(21) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in a substrate and said light emitting device is closed for with said light transmission nature ingredient containing said fluorescent substance.
(22) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in the cup section prepared in the substrate, and said cup section is filled up with said light transmission nature ingredient containing said fluorescent substance for.
(23) Said light emitting device is luminescence equipment according to claim 3 characterized by what it is laid in the cup section prepared in the substrate, and the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance is prepared for in the front face of said light emitting device.
(30) Luminescence equipment according to claim 3 with which the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance is characterized by what is prepared in the substrate front face of said light emitting device.
(31) Luminescence equipment given in (30) to which the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance is characterized by what is prepared also in the side face of said light emitting device.
(32) Luminescence equipment according to claim 4 with which the fluorescent substance layer which consists of said fluorescent substance is characterized by what is prepared in the substrate front face of said light emitting device.
(33) Luminescence equipment given in (32) to which the fluorescent substance layer which consists of said fluorescent substance is characterized by what is prepared also in the side face of said light emitting device.
(40) Luminescence equipment according to claim 3 characterized by what it has a reflecting plate in the direction of light emission of said light emitting device for.
(41) Luminescence equipment given in (40) characterized by what the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance is prepared for on the field which counters said light emitting device of said reflecting plate.
(42) Luminescence equipment according to claim 4 characterized by what it has a reflecting plate in the direction of light emission of said light emitting device for.
(43) The field where said reflecting plate consists of said fluorescent substance, and said light emitting device of this reflecting plate counters, and a reverse field are luminescence equipment given in (42) characterized by what is mirror-plane-ized.
(50) Luminescence equipment according to claim 3 characterized by what it has for the fluorescent substance layer which consists of said light transmission nature ingredient containing said fluorescent substance in the direction of light emission of said light emitting device.
(51) Luminescence equipment according to claim 4 characterized by what it has the fluorescent substance layer which consists of said fluorescent substance for in the direction of light emission of said light emitting device.
(52) It is luminescence equipment given in (50) which it has further the transparent material which has an optical installation side and a luminescence side, and said light emitting device counters said optical installation side of said transparent material, is arranged, and is characterized by what said fluorescent substance layer is arranged for between said semi-conductor light emitting devices and said optical installation sides of said transparent material, or (51).
(53) It is luminescence equipment given in (50) which it has further the transparent material which has an optical installation side and a luminescence side, and said light emitting device counters said optical installation side of said transparent material, is arranged, and is characterized by what said fluorescent substance layer is arranged for at said luminescence side side of said transparent material, or (51).
(54) Luminescence equipment given in (53) to which the layer which consists of a light transmission nature ingredient between said transparent materials and said fluorescent substance layers is characterized by what it has further.
(60) Said light emitting device is luminescence equipment given in (10) - (12) characterized by what is been an III group nitride system compound semiconductor light emitting device, (20) - (23) and (30) - (33), or (40) - (43) and (50) - (54).

[Translation done.]

*, NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It is luminescence equipment which is equipped with the light emitting device in the range whose luminescence wavelength is 360nm - 550nm, and the fluorescent substance which consists of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation of Eu2+, and is characterized by what wavelength conversion of a part of light of said light emitting device is carried out with said fluorescent substance, and is emitted.
[Claim 2] The luminescence wavelength of said light emitting device is luminescence equipment according to claim 1 characterized by what it is in the range of 450nm - 550nm, and is done for luminescence of a white system by mixing and emitting a part of said light by which wavelength conversion was carried out, and other light of said light emitting device.
[Claim 3] Said fluorescent substance is luminescence equipment according to claim 1 or 2 which is fine particles or grain and is characterized by what is contained into the light transmission nature ingredient.
[Claim 4] Said fluorescent substance is luminescence equipment according to claim 1 or 2 characterized by what is been a vitreous humour.
[Claim 5] Said light emitting device is luminescence equipment according to claim 1 to 4 characterized by what is been an III group nitride system compound semiconductor light emitting device.
[Claim 6] The luminescence approach which irradiates the fluorescent substance which consists the light of the light emitting device in the range whose luminescence wavelength is 360nm - 550nm of calcium-aluminum-Si-O-N system oxy-night RAIDO which carried out activation in Eu2+, carries out the wavelength conversion of the part, is the luminescence approach of the luminescence equipment which mixes and emits a part of these light by which wavelength conversion was carried out, and other light of said light emitting device, and is characterized by what said light emitting device turns on for intermittently.
[Claim 7] The luminescence approach according to claim 6 characterized by what the luminescent color of said luminescence equipment is adjusted for by adjusting the burning time amount of said light emitting device.
[Claim 8] It is the luminescence approach according to claim 7 characterized by what the luminescence wavelength of said light emitting device is in the range of 480nm - 550nm, and said luminescent color is a white system.
[Claim 9] Said light emitting device is the luminescence approach according to claim 6 to 8 characterized by what is been an III group nitride system compound semiconductor light emitting device.

[Translation done.]

JAPANESE [JP,2002-076434,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]